

Abstract:

An apparatus and a method are disclosed for rapidly controlling the rate of ion generation in an ion source. The ion source includes an ion chamber, filament-cathode, a mirror electrode, and a grid. The ion source is operable to generate an ion beam from the ionization of ion precursor gas present in the ion chamber by electrons emitted from the filament. The rate of ion generation is controlled by modifying the potential of the grid relative to the filament to control the number of electrons available for ionization between the grid and the mirror electrode. An alternative embodiment for rapidly controlling the rate of ion generation in an ion source is also disclosed. In the alternative embodiment, the ion source comprises an ion chamber having mutually opposed sides and configured to receive ion precursor gas; a filament-cathode located on one side of said ion chamber and operable to emit electrons for the ionization of the precursor gas for the generation of the ion beam; and a mirror electrode having a potential associated therewith and located on the other side of said ion chamber. The mirror electrode is connected to a circuit to vary its potential relative to said filament so as to vary the number of the electrons available in the ion chamber for ionization.